

**REMARKS**

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, claims 7-9 have been amended to recite a "nanoprinting" mold, with claim 7 being further amended to recite that such mold is a mold for forming a fine structure on a resin substrate or on a resin film on a substrate.

Moreover, Applicants are adding new claims 10-14 to the application. Claim 10, dependent on claim 7, defines material of the mold, consistent with the description in the third full paragraph on page 6 of Applicants' specification; and claims 11 and 12, dependent respectively on claims 8 and 11, respectively recites that the mold-releasing agent is a silicone mold-releasing agent, and recites that the silicone mold-releasing agent is polydimethyl siloxane, consistent with the description in the second paragraph of Example 1, on page 7 of Applicants' specification. Claim 13, dependent on claim 8, recites that the mold-releasing layer is a diamond-like carbon layer, consistent with description in Example 2, in the paragraph bridging pages 8 and 9 of Applicants' specification. Claim 14, dependent on claim 7, recites that the release treatment is a treatment such that in removing the mold from resin which forms the fine structure, projections of the resin are elongated as compared to a depth of concave portions of the mold. In connection with claim 14, note, for example, the sole full paragraph on page 8, as well as the paragraph bridging pages 8 and 9, of Applicants' specification.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the references applied by the Examiner in rejecting claims in the Office Action mailed

February 23, 2007, that is, the teachings of the U.S. patents to Chou, No. 6,309,580, and to Hubert, et al., No. 6,957,608, under the provisions of 35 USC 103.

It is respectfully submitted that these references as applied by the Examiner would have neither taught nor would have suggested such a nanoprinting mold as in the present claims, wherein a release treatment is provided only on a top surface of convex portions of the mold (see claim 7); in particular, wherein such release treatment is a treatment such that in removing the mold from resin which forms the fine structure produced by molding, projections of the resin are elongated as compared to a depth of concave portions of the mold (see claim 14).

In addition, it is respectfully submitted that these references as applied by the Examiner would have neither taught nor would have suggested such a nanoprinting mold as in the present claims, having features as discussed previously in connection with claim 7, and, additionally, wherein the release treatment provides a mold-releasing layer only on the top surfaces of the convex portions of the mold, whereby the mold includes the mold-releasing layer only on the top surfaces of the convex portions (note claim 8), particularly wherein the mold-releasing agent is a silicone mold-releasing agent (note claim 11), especially polydimethyl siloxane (see claim 12), or wherein the mold-releasing layer is a diamond-like carbon layer (see claim 13); and/or wherein the mold-releasing layer has a thickness smaller than a pattern depth of the mold (see claim 9); and/or material of the mold as set forth in claim 10.

It is emphasized that according to the present invention the releasing treatment is applied only at top surfaces of the convex portions of the mold. By providing the release treatment, in particular, by providing the mold-releasing layer, only at top surfaces of the convex portions of the mold, that is, selectively as in the present claims, columnar structures formed by molding, illustratively, and not to be

limiting, can have a height three times as large as the depth of the mold, the columnar structure not being an exact transfer of the shape of the mold. As stated on page 8 of Applicants' specification, if the mold-releasing agent is formed at both convex and concave portions of the mold, the resin would come off so smoothly during the release step that the concave-convex pattern of the mold would often be transferred exactly as is. Under such circumstances, desired columnar structure which is a feature of the present invention would not be obtained. Therefore, as in the present invention, if the columnar structure of a desired shape is to be obtained with high reproducibility, the mold-releasing agent is to be applied only to the top surfaces of the convex portions of the mold.

Chuo discloses a process of using an improved mold or microreplication surface that creates patterns with ultra fine features in a thin film carried on a surface of a substrate. A molecular moiety having release properties towards other materials (e.g., fluorinated hydrocarbon chains or polysiloxanes) and low chemical reactivity to moldable polymers is bonded to a mold or microreplication surface. The release properties of the molecular moiety having release properties allows for the enhancement of resolution on the molded article since the molded material is released from the minute features of the mold on a molecular level. Note, for example, the paragraph bridging columns 2 and 3 of this patent. See also column 3, lines 21-27; and column 4, lines 56-62. Note also the paragraph bridging columns 5 and 6, describing the specific type reactive compound bonded to the mold surface. See also Figs. 1A-1E, and descriptions in connection therewith in the paragraph bridging columns 7 and 8 of this patent. Note also column 9, lines 36-39 and 61-64.

It is respectfully submitted that Chuo does not disclose, nor would have suggested, such mold as in the present claims, having a release treatment provided

only on top surfaces of the convex portions of the mold, and advantages thereof as discussed in the foregoing; and, in particular, would have neither taught nor would have suggested the advantage of the nanoprinting mold of the present invention of providing elongated columnar structure of the selectively treated mold of the present invention.

It is respectfully submitted that the additional teachings of Hubert, et al. would not have rectified the deficiencies of Chuo, such that the presently claimed invention as a whole would have been obvious to one of ordinary skill in the art.

Hubert, et al. discloses contact printing for the fabrication of micro-devices, with controlled printing using liquid embossing techniques. Note column 1, lines 48-50. This patent discloses that liquid embossing involves depositing or coating a layer of liquid ink on a suitable substrate or print medium, and that the liquid inks comprise nanoparticles that are dispersed in a solvent medium. See column 1, lines 63 and 64, and column 2, lines 10-12. This patent addresses the problem of producing multiple prints with high throughput, with a contact print method. See column 1, lines 37-44. According to Hubert, et al., the stamp is modified by treating protruding features, the recessed features or a combination thereof, with a surface modifier (such as a metal, a polymer and/or a fluorochemical), chemical exposure (such as with an oxidant or an etchant), radiation (such heat or light) and/or any combination thereof; and that where the protruding features of the stamp are treated with a surface modifier, a thin layer of surface modifier can be deposited on to regions of contact between the substrate or printed medium and the stamp during the embossing process which alters or modifies the surface properties of the substrate or print medium in the regions of contact and prevents the re-flow of the

liquid ink. See column 3, lines 40-52. Note also column 3, lines 34-40 and 53-57.

Note also column 5, lines 6-9.

Initially, it is emphasized that Chuo is directed to formation of release surfaces, for a mold, while Hubert, et al. is concerned with contact print methods. Chuo addresses the problem of producing smaller pattern size while maintaining cost efficiency, while Hubert, et al. is concerned with producing multiple prints with high throughput. In view of differences in technology between that of Chuo and that of Hubert, et al., and different problems addressed by each, it is respectfully submitted that one of ordinary skill in the art concerned with in Chuo would not have looked to the teachings Hubert, et al. In other words, it is respectfully submitted that the teachings of Chuo and of Hubert, et al., are directed to non-analogous arts.

In addition, the problems addressed by the present invention, e.g., as described on pages 2 and 3 of Applicants' specification, are noted. Such problems are clearly different from the problem addressed by Hubert, et al. As the problems are different, it is respectfully submitted that one of ordinary skill in the art would not have looked to the teachings of Hubert, et al.

In any event, again emphasizing the differences in technology and problems addressed in Chuo and in Hubert, et al., it is respectfully submitted that there would have been no reason to combine the teachings of Chuo and Hubert, et al., absent hindsight use of Applicants' disclosure, which of course is improper under the guidelines of 35 USC 103.

For the foregoing reasons, it is respectfully submitted that the rejection under 35 USC 103 is improper, and withdrawal thereof is respectfully requested.

Even assuming, arguendo, that the teachings of Chuo and of Hubert, et al. were properly combinable, it is respectfully submitted that such combined teachings

would have neither disclosed nor would have suggested the presently claimed invention. Thus, it is emphasized that Hubert, et al. discloses treatment of the stamp to enhance the ability of the protruding features to displace the liquid ink by modifying the surface energy and/or modifying the wettability of the protruding stamp surfaces relative to the recessed stamp surfaces. It is respectfully submitted that such disclosure of “modifying the surface energy and/or modifying the wettability of the protruding stamp surfaces”, even in light of the teachings of Chuo, would have neither disclosed nor would have suggested the release treatment provided only on top surface of the convex portions of the mold, as in the present invention, and advantages thereof.

The contention by the Examiner in the first paragraph on page 3 of the Office Action mailed February 23, 2007, that Hubert, et al. teaches the concept of differentiated protruding surfaces that are coated and different from recessed surfaces, is noted. However, it is respectfully submitted that Hubert, et al. discloses providing protruding surfaces substantially different from recessed surfaces to alter or modify the surface properties of the substrate or print medium in the regions of contact, and preventing re-flow of liquid ink. Note column 3, lines 45-52, of Hubert, et al. It is respectfully submitted that such disclosure, even in combination with the teachings of Chuo, would have neither taught nor would have suggested such release treatment as in the present claims, in particular, providing the mold-releasing layer, achieving advantages of the present invention as discussed previously.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims being considered on the merits in the above-identified application are respectfully requested.

August 23, 2007

To the extent necessary, Applicants hereby petition for an extension of time under 37 CFR 1.136. Kindly charge any shortage of fees due in connection with the filing of this paper, including any extension of time fees, to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP, Account No. 01-2135 (case 1021.43681X00), and please credit any overpayments to such Deposit Account.

Respectfully submitted,

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